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Electrical machine 2..... 2014/2015



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1) A1 ϕ , 100 kVA, 11,000/2200 V, 60 Hz transformer has the following parameters.

$$R_{HV}=6.0\Omega$$

$$L_{HV}=0.08H$$

$$Lm_{HV}=160H$$

$$Rc_{HV}=125k\Omega$$

$$R_{LV}=0.28\Omega$$

$$L_{LV}=0.0032H$$

Obtain an equivalent circuit of the transformer:

- a. Referred to the high-voltage side.
- b. Referred to the low-voltage side.

2) A1 ϕ , 440V, 80kW load, having a lagging power factor of 0.8, is supplied through a feeder of impedance $0.6+j1.6\Omega$ and a 1 ϕ , 100kVA, 2200/440V, 60Hz transformer. The equivalent impedance of the transformer referred to the high-voltage side is $1.15 +j4.5\Omega$.

- a. Draw the schematic diagram showing the transformer connection.
- b. Determine the voltage at the high-voltage terminal of the transformer.
- c. Determine the voltage at the sending end of the feeder

3) A 240 kVA ,480/4800V step up transformer has the following parameters

$$R_{HV}=2.5\Omega$$

$$XL_{HV}= 5.75 \Omega$$

$$R_{LV}=250m\Omega$$

$$XL_{LV}= 57.5m\Omega$$

The transformer is operating at 50% of its rated load if the load is purely resistive load determine:

- a. the voltage at the low-voltage terminal of the transformer.
- b. the secondary and primary winding currents.
- c. the efficiency of transformer

4) A1 ϕ , 3 kVA, 240/120 V, 60 Hz transformer has the following parameters.

$$R_{HV}=0.25\Omega$$

$$XL_{HV}= 0.75 \Omega$$

$$R_{LV}=0.05\Omega$$

$$XL_{LV}= 0.18 \Omega$$

- a. determine voltage regulation when transformer is supplying full load at 110V and 0.9 leading power factor.
- b. If the load terminals are suddenly shorted circuited determine the currents in the high and low voltage windings.